

Proposal #2001 - 6-205 (Office Use Only)

## PSP Cover Sheet (Attach to the front of each proposal)

Proposal Title: ***Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefit, subsidence and water quality***

Applicant Name: Ducks Unlimited Inc.

Contact Name: Olen Zirkle, Land and Water Specialist

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Amount of funding requested: \$6,339,498

Some entities charge different costs dependent on the source of the funds. If it is different for state or federal funds list below.

State cost: (to be determined)

Federal cost: (to be determined)

Cost share partners? Yes X No

Identify partners and amount contributed by each \_\_\_\_\_

Indicate the Topic for which you are applying (check only one).

- |  |  |
|--|--|
| <input type="checkbox"/> Natural Flow Regimes                | <input checked="" type="checkbox"/> Beyond the Riparian Corridor     |
| <input type="checkbox"/> Nonnative Invasive Species          | <input type="checkbox"/> Local Watershed Stewardship                 |
| <input type="checkbox"/> Channel Dynamics/Sediment Transport | <input type="checkbox"/> Environmental Education                     |
| <input type="checkbox"/> Flood Management                    | <input type="checkbox"/> Special Status Species Surveys and Studies  |
| <input type="checkbox"/> Shallow Water Tidal/Marsh Habitat   | <input type="checkbox"/> Fishery Monitoring, Assessment and Research |
| <input type="checkbox"/> Contaminants                        | <input type="checkbox"/> Fish Screens                                |

What country **or** counties **is** the project located **in**? San Joaquin County & Sacramento County

What CALFED ecozone is the project located **in**? See attached list and indicate number. Be as specific as possible.

Sacramento-San Joaquin Delta: 1.1, North Delta

Indicate the type of applicant (check only one):

- |  |  |
|--|--|
| <input type="checkbox"/> State agency                    | <input type="checkbox"/> Federal agency        |
| <input type="checkbox"/> Public/Non-profit joint venture | <input checked="" type="checkbox"/> Non-profit |
| <input type="checkbox"/> Local government/district       | <input type="checkbox"/> Tribes                |
| <input type="checkbox"/> University                      | <input type="checkbox"/> Private party         |
| <input type="checkbox"/> Other: _____                    |  |

**Indicate the primary species which the proposal addresses (check all that apply):**

- ☐ San Joaquin and East-side Delta tributaries fall-run chinook salmon  
☐ Winter-run chinook salmon  
☐ Late-fall run chinook salmon  
☐ Delta smelt  
☐ Splittail  
☐ Green sturgeon  
☐ White Sturgeon  
☒ Waterfowl and Shorebirds  
☒ Migratory birds  
☐ Other listed T/E species: \_\_\_\_\_
- ☐ Spring-run chinook salmon  
☐ Fall-run chinook salmon  
☐ Longfin smelt  
☐ Steelhead trout  
☐ Striped bass  
☐ All chinook species  
☐ All anadromous salmonids  
☐ American shad

**Indicate the type of project (check only one):**

- ☐ Research/Monitoring  
☒ Pilot/Demo Project  
☐ Full-scale Implementation
- ☐ Watershed Planning  
☐ Education

**Is this a next-phase of an ongoing project?** Yes ☐ No ☒

**Have you received funding from CALFED before?** Yes ☒ No ☐

If yes, list project title and CALFED number:

Project Name:	CALFED Number:
Lower Butte Creek Project: Phase II –Preliminary Engineering and Environmental Analysis for Butte Sink Structural Modifications and Flow-through System‘	99-B02
Gomill Dam Fish Screen	96-M22
M & T/Parrott, Pumping Station and Fish Screen	95-M05
Rancho Esquon/Adamas Dam Fish Screen	96-M21
San Pablo Bay NWR, Cullinan Ranch	97-N18
San Pablo Bay NWR, Tolay Creek	97-N19

**Have you received funding from CVPIA before?** Yes ☒ No ☐

If yes, list CVPIA program providing funding, project title and CVPIA number (if applicable):

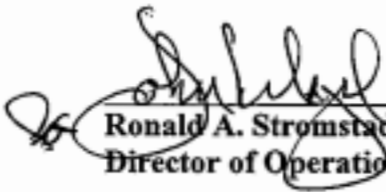
Project Name:	CVPIA Number:
Lower Butte Creek Project, Phase III – Butte Creek, Drumheller Exclusion Barrier Final Engineering, Permitting and Construction	1448-11332-9J006
Lower Butte Creek Project, Phase II – Butte Creek, Butte Sink/Sutter Bypass Stakeholder Coordination/Facilitation	113329-9-5135
Lower Butte Creek Project, Phase II – Butte Creek, Sutter Bypass East-West Diversion Dam Preliminary Engineering and Environmental Review	113329-9-J122
Lower Butte Creek Project, Phase II – Butte Creek, Sutter Bypass Weir #5 Preliminary Engineering and Environmental Review	11332-9-J122
Lower Butte Creek Project, Phase II – Butte Creek, Sutter Bypass Weir #3 Preliminary Engineering and Environmental Review	113329-9-5136

**By signing below, the applicant declares the following:**

- The truthfulness of all representations in their proposal;
- The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

Ducks Unlimited, Inc.

**Name of Applicant**

  
\_\_\_\_\_  
**Ronald A. Stromstad**  
**Director of Operations**

## **B. Executive Summary**

*Title of Project:* Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.

*Requested Amount:* \$6,339,498

*Applicant:* DUCKS UNLIMITED, INC.

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Olen Zirkle, Land and Water Specialist

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*Participants/Collaborators:* DUCKS UNLIMITED, INC., Central Valley Habitat Joint Venture, the

Cortopassi Family, Local Reclamation Districts and Individual Landowners

Since the Delta was drained in the late 1800's, agriculture in the Sacramento-San Joaquin Delta has become an essential part of the California economy: The highly organic soils of over 60 islands and tracts have been drained and are undergoing continuous subsidence that affects the Delta levee system and may be the largest threat to long-term agricultural sustainability in the Delta. The Delta Rice pilot/demonstration project is scaled to be an economically feasible, locally-driven, and science-based study to address the feasibility of managing soil subsidence on Delta islands by converting furrow/sub-irrigated crops (predominantly corn) to flooded irrigated crops (rice). The CALFED Subsidence Team (1998) has recommended reverse wetland flooding to manage the long-term threat of soil subsidence and this type of action is replicated in summer-flooded rice production. However, there is a lack of information on the economic feasibility to convert from corn to rice production across the varied soil and climatic conditions that exist throughout the Delta. There is also an information gap regarding the impact of flooded rice production on soil subsidence, water quality and wildlife habitat across these variable conditions. This project will address these important issues by working directly with a Delta farming operation that has converted 1,000-1,500 acres to rice and will conduct in-depth monitoring and assessment of the physical and environmental changes as a result of the conversion. An incentive program is designed within the project to enlist more farmers to convert their crops to expand the area of influence within the broader geographical area of the Delta. It is important to understand the response of crop conversion on the mosaic of Delta climates and soil types and to monitor the associated ecosystem changes. By implementing this incentive-based program, the project proposes to convert 10,000 acres of furrow/sub-irrigated crops to flooded rice production over a three-year period. The primary objective is to test the hypotheses that conversion from corn to rice will appreciably decrease the soil subsidence rate in impacted areas and demonstrate the economic feasibility of rice production in the Delta.

This project will be located in the (No. 14) Central and West Delta of the (No. 1) Sacramento- San Joaquin Delta Ecological Management Zone. The primary hypothesis to be tested is that conversion from corn to rice will appreciably decrease the soil subsidence rate in impacted areas. Other uncertainties in this project are related to the economic feasibility of growing rice in the Delta, and how conversion will impact water quality and wildlife habitat. To determine if rice production is an economically sound alternative to corn production costs and income will be calculated from crop conversion over the variety of conditions found in the Delta. Agronomic and economic data from this project will be compiled and published. Long-term (10-20 Year) economic feasibility of rice production in the Delta will be assessed in partnership with the California Rice Commission. Addressing the uncertainties of the impact on water quality will require testing the hypothesis that water quality at corn and rice water discharge sites do not differ. Water discharge on project study sites will be monitored for temperature, salinity, pH, dissolved oxygen, biological oxygen demand, total organic carbon, and bromide. Evaluating the uncertainties related to the impact on wildlife will focus on evaluating the impact on migratory waterbird migration and wintering habitat. California winters approximately 20 % of the continental waterfowl population and as much as 60 % of the Pacific Flyway population. The agricultural area of the Delta provides a significant proportion of that habitat. The Central Valley is also one of the most important regions in western North America for migrating and wintering shorebirds. Thus, understanding how the conversion from corn to rice will impact waterbirds that use the area will be critical in evaluating the success of the project. To evaluate the impact on migratory waterbirds we will test the hypothesis that use and productivity of nutrients available to waterbirds do not differ between corn and rice fields in the project area. The expected outcome is to provide a broad spectrum of data that can be used to assess the feasibility of using rice production to manage island subsidence on the Delta and understanding the environmental impact this conversion would have.

## C. Project Description

**Statement of Problem:** Failure of levees as a result of island subsidence in the Sacramento– San Joaquin Delta is resulting in Delta island flooding which impacts agricultural productivity, associated wildlife habitat and the overall economic viability of the area.

### Problem:

Since the Delta was drained in the late 1800's, agriculture in the Sacramento-San Joaquin Delta has become an essential part of the California economy. The highly organic soils of over 60 islands and tracts have been drained and are undergoing continuous subsidence that affects the Delta levee system. Currently, soil subsidence may be the largest threat to long-term agricultural sustainability. Soil subsidence causes a decrease in levee integrity, thus increasing flooding potential. Weir (1950) estimated an annual loss of approximately 7.62 cm of soil per year from 1922 to 1948. Although the rate of loss has apparently declined in more recent decades (Rojstaczer and Deverel 1995), estimates of soil subsidence still range from 0.5 to 1.5 cm annually (Rojstaczer and Deverel 1995, Deverel and Rojstaczer 1996).

There are numerous potential causes for soil subsidence such as mechanical compaction, wind erosion, and anaerobic decomposition; however, oxidation of organic soils is likely the primary contributor (Deverel and Rojstaczer 1996). Oxidation rates vary with soil temperature, aeration and moisture content, wetting and drying frequency, pH, and percent plant residue (Deverel and Rojstaczer 1996). The CALFED subsidence sub-team (1998) proposed 4 ways of managing island subsidence; (1) minimizing or preventing the lowering of the groundwater level, (2) capping or covering susceptible surface deposits with mineral soil, (3) permanent shallow flooding, and (4) reverse wetland flooding. Reverse wetland flooding, which involves flooding during the summer period, should decrease soil oxidation by lowering soil temperature and reducing oxygen availability when temperatures are highest and oxidizing microbes are most active. Agricultural practices that mimic reverse wetland flooding should increase the potential for long-term sustainability of agriculture in the delta.

We are proposing a demonstration program to determine the feasibility of long-term rice farming in the Delta. Rice farming, which requires inundation of 5-30 cm of water during germination and growth, should mimic reverse wetland flooding.

To add continuity and limit repetition, the following categories presented in the PSP format are discussed within the text of this proposal to comprehensively describe the project and the proposed scope of work:

- Conceptual Model (See Attachment B – Conceptual Model)
- Hypotheses to be tested
- Adaptive Management
- Approach
- Monitoring and Assessment Plan

### Location and/or Geographic Boundaries of the Project:

County: San Joaquin  
Ecozone: Sacramento – San Joaquin Delta  
Geographical  
Coordinates: Latitude 39°8'31" Longitude 21°49'52"

(See Attachment A – Map, Photos, Plans)

### Conceptual Model and Adaptive Management:

An adaptive management program will typically follow an iterative cycle of planning, implementation, evaluation, and modification of implementation objectives as new information is gained to improve future

delivery of management goals. We have followed this process in creating our conceptual model for this project (Attachment B).

### ***Initial implementation***

Approximately 1,000 acres of rice are currently in production in the Delta and will be used to collect preliminary data. Data will then be used as the basis for a preliminary analysis to determine the economic feasibility of growing rice in the region. We will also use this information to conduct public workshops on the potential costs and benefits of converting from corn to rice and to contract growers for the demonstration project.

#### **Approach:**

Preliminary information will be gathered from an existing pilot project of 1,000 acres planted on Brack Tract by the Cortopassi Family and their tenant operators. The preliminary information will be used to determine initial production for calculating economic feasibility and agronomic procedures. Beginning with this preliminary information, workshops will be set up in early fall of the first year of the project to present the economic and agronomic data and discuss an incentive plan that is designed to encourage landowners and tenants (cooperators) to make the capital investment and convert their land to rice. The incentive plan is comprised of two parts. The initial payment of \$250/acre will cover the cost of converting the land to allow for rice culture and involves laser leveling and installation of the rice borders. The second payment \$50/acre will be an annual payment for the first three years to cover the cost of preparing and managing a winter flooding program. Cooperators showing interest at the workshop will be contacted and if willing, contractually enlisted in the three-year program. Selection will be prioritized to ensure a representative sample of the climatic and soil type variability of the Delta is enrolled in the program.

### ***Secondary Planning Phase***

After data is collected from rice and corn already in production during the initial evaluation phase, a secondary planning phase will begin to determine what, if any, alterations should be made in the analysis of economic feasibility of rice farming, implementation of the conversion from corn to rice and rice farming practices, or in the data being collected in the evaluation process itself. This information will also be used in prioritizing and selecting potential landowners for the demonstration project.

### ***Second and Third Implementation Phases***

Implementation for years two and three will be the conversion of 5,000 acres of corn to rice each year, and in year two, identifying landowners for the third implementation phase.

This iterative cycle of planning, implementation, and, evaluation will continue for the life of the project. The variables being measured to evaluate the feasibility of rice production and the effects of conversion to rice (e.g. rice production per acre or invertebrate and moist soil plant seed availability for waterfowl) will likely change over a longer time period than the 2 years allowed for evaluation in this proposal. Furthermore, as summer breeding habitat on rice levees is established, breeding population of waterbirds should be positively impacted. Thus, further evaluation will be needed in the future to properly assess the economic feasibility and environmental impact of this project.

### ***Evaluation***

Although conversion of corn farming to rice farming should decrease soil oxidation there are four areas of uncertainty that need to be addressed before we can determine if conversion from corn to rice is both economically feasible and environmentally sound.

**I.**      **Subsidence:** The first area of uncertainty, and primary reason for this demonstration project, is to determine if the decrease in oxidation rate causes the desired effect of substantially decreasing the rate of soil subsidence over the large range of conditions found within the Delta. Although decreasing soil oxidation rate should decrease subsidence (Broadbent 1960, Rojstaczer and Deverel 1995, Deverel and Rojstaczer 1996), other factors such as anaerobic activity in the deeper peat layer may play a substantial role in subsidence, especially in areas where the peat layer is deepest. Therefore, any reduction in oxidation of the more shallow

soil layers may be irrelevant. This project will need to cover the entire mosaic of soil types found in the Delta to determine if the benefits from rice farming are adequate to justify the financial investment of converting corn to rice in all soil types.

**11. Economic Viability:** The second area of uncertainty is whether rice production in this region is economically feasible on a short and long-term basis. Since temperatures in this region are slightly lower than in the Sacramento Valley, the main rice-growing region of the Central Valley, the production is likely to be slightly lower, even when using varieties developed for cooler climates. Furthermore, soils of the Delta are more organic thus permeable to water than soils of the Sacramento Valley. Rice farming in these organic soils may lead to higher maintenance costs of rice checks, as well as a decrease in the proportion of land that can be put into productivity because of the need for larger rice levees. A preliminary study and cost analysis by the Cortopassi Family (Appendix 1) suggests that rice farming under current economic conditions is likely to be economically feasible, but a larger scale project over a variety of soil conditions needs to be conducted to properly determine whether rice farming is economically feasible over the variety of conditions found in the Delta. Data needed for assessing this will include estimates of production and production costs over a variety of conditions and current and projected prices of rice. Furthermore, financial consideration will be given to *the* environmental benefits of rice versus corn if rice is found to be more environmentally compatible. If we find that long-term farming of rice is not feasible with data collected from the first **two** years of the study using current farming practices, alternative practices will be sought and implemented to make rice farming more economically viable.

**111. Water Quality:** The third area of uncertainty is the amount of dissolved organic carbon (DOC) and potentially harmful solvents that will be released in the water from rice fields. Previous studies in the Sacramento Valley found solvents in water released from rice fields were insufficient to be of concern, however, soil types of the Delta are considerably different than those of the Sacramento Valley, thus monitoring of the quality of water being released from rice fields in the Delta is needed. Again, if data from the first **two** years indicate quality of the water leaving the fields during drawdowns is below water being released from corn fields or specified standards, alternative practices will be sought to alleviate the problem.

**IV. Waterbird Habitat Quality:** The fourth area of uncertainty is the impact on wildlife that uses the Delta. California winters approximately 20 % of the continental waterfowl population and as much as 60 % of the Pacific Flyway population (Heitmeyer et al. 1989). The agricultural area of the Delta provides a significant proportion of that habitat (CVHJV Implementation Plan). Current management strategy for waterfowl is dependent on agricultural habitat to supply 28 % of the energetic needs for waterfowl during the winter period. In the Delta corn currently supplies the majority of this energy. Furthermore, energy from waist grain is likely not the only important nutrient available in agricultural fields. Seeds from moist soil plants (weeds) as well as invertebrates likely provide protein as well as other essential nutrients (Fredrickson and Taylor 1982). The Central Valley is also one of the most important regions in western North America for migrating and wintering shorebirds (Page and Shuford 2000). Shorebird populations in the Central Valley in the early 1990s averaged 303,000 in January, and 335,000 in April (Shuford et al. 1998). In winter and spring, the Central Valley supports more shorebirds than any other inland site in western North America, and in winter is the only inland area, other than California's Salton Sea and Oregon's Willamette Valley, that supports tens of thousands of shorebirds. In fall, it is the second most important inland site to shorebirds after Great Salt Lake, Utah. Flooded agricultural fields provide a substantial portion of the shorebirds as well as other waterbird migration and wintering habitat in the Central Valley (Elphick 1998). Thus, understanding how the conversion from corn to rice will impact waterbirds that use the area will be critical in evaluating the success of the project.

### **Hypotheses being tested:**

**I. Subsidence:** Growing rice on Delta organic soils may result in net carbon accumulation and therefore stop subsidence and/or accrete the land surface (Deverel et al. 1998). The objective of this proposed work is to determine land surface elevation changes and the carbon budget in Delta organic soils where rice will grow.

- H<sub>0</sub>1: There is no difference in island subsidence rate between agricultural areas growing corn and rice.**
- H<sub>0</sub>2: There will be no difference in carbon release between agricultural areas growing corn and rice.**

We will measure (1) land surface elevation changes and accretion; and, (2) the carbon budget in Delta rice fields. We will measure land surface elevation changes using traditional leveling from benchmarks of known elevation and a sedimentation erosion table (SET) as described in Boumans and Day (1993). Deverel and Rojstaczer (1996) showed that land surface elevation fluctuated substantially with groundwater level changes. Therefore, we will also monitor groundwater levels using transducers and data recorders. We will also determine the biomass that accumulates on feldspar markers placed in the field prior to flooding using methods described in Cahoon et al. (1996).

We will estimate annual carbon (plant biomass) inputs with destructive harvests of live standing biomass and turnover estimates. We will measure all above- and below-ground live plant material using destructive harvests of replicate samples in each field. Plant matter will be dried, weighed, ground and analyzed for carbon and ash content. We will multiply this measure of plant productivity by an annual rate of turnover (a measure of total annual plant productivity relative to the standing mean) to estimate total annual carbon inputs to the system. To assess gaseous carbon losses, we will make monthly or seasonal diffusive gaseous carbon flux measurements ( $\text{CO}_2$  and  $\text{CH}_4$ ) using closed floating chambers and gas chromatographs.

## **II. Economics**

The next area of uncertainty to be addressed regards the economic feasibility of growing rice in the Delta over a variety of conditions on a long-term basis. Although a hypothesis will not be tested here, information gathered from the 10,000-acre demonstration project will be used to assess the economic feasibility of producing rice over the varying conditions of the Delta. Costs and profits (summarized in appendix 1) will be calculated for both rice and corn under the varying geographic locations. A comparison will then be made between the two crop types to determine if net profits differ. We will also use information on costs from this project and projected income from the California Rice Commission to estimate the long-term (10 to 20 year) economic feasibility of rice production in the Delta. Although it is difficult to place an economic price on environmental benefits, these benefits should be considered when calculating the value of the two crops. Therefore, in the analysis, considerations will be given to environmental benefits and impacts, but will be primarily subjective..

### **111. Water Quality**

- H<sub>0</sub>3: There is no difference in water quality between water discharges from corn and rice fields.**

Statistical tests for differences between these variables will be conducted on water samples between the two field types. However, our hypothesis to be tested is the same as the null hypothesis, and because conclusions from negative tests are invalid, we will conduct power analysis to determine the detectable magnitude of differences for assessing the impact of the conversion. Water quality at discharge locations in both corn and rice fields will be monitored every three weeks during discharge period of the growing season beginning at the initial drawdown in rice fields. Samples will be taken from 10 corn and 2 rice fields during year 1, and 10 corn and 10 rice fields during years 2 & 3. Water quality on project study sites will be monitored for several parameters including temperature, salinity, pH, dissolved oxygen, biological oxygen demand, total organic carbon, and bromide following the techniques set forth by the American Public Health Association (1989). If there are no apparent differences in water quality between the two field types then no changes in rice farming practices will be made. However, if any of the measured parameters are different, then changes in the rice farming practices will be made to alleviate the difference.

#### IV. 'WaterbirdHabitat Quality

**H<sub>0</sub>4:** Corn supplies the same quality of waterbird migrating and wintering habitat as rice.

The final area of uncertainty is how conversion from corn to rice will impact waterbirds that use these fields for migration and winter habitat. Because variables such as water depth and habitat juxtaposition are the primary factors determining habitat use by waterbirds (Elphick 1998), we will not only need to monitor waterbird use, but will need to monitor the variables that directly differ between corn and rice and are likely to dictate quality of habitat for waterbirds.

Our current understanding of waterfowl migratory and wintering ecology suggests that availability of some type of nutrient, likely energy is the primary factor limiting waterfowl populations during winter and migration (Haramis et al. 1986; Miller 1986; Eichholz et al. in prep; Conroy et al. 1989; Bergan and Smith 1993; Jeske et al. 1994;). Furthermore, evidence suggests habitat condition and availability on wintering areas influences reproductive success (Raveling and Heitmeyer 1989, Heitmeyer and Fredrickson 1981, Kaminski and Gluesing 1987). Although our understanding of wintering and migratory ecology of shorebirds is considerably more limited than for waterfowl, similar assumptions have been made about the influence of food energy on survival (Page and Shuford 1999). Thus, we will use availability of nutrients (energy and protein), as a surrogate of habitat quality to determine which crop type is more beneficial to waterbirds. Quantifying the amount of nutrients available to waterfowl in different types of habitat however is difficult. Perception of food availability and the food actually available to foraging waterbirds likely differ. For example, although waterfowl biologists recognize that not all waste grain is available for consumption by waterfowl (Baldassarre and Bolen 1984, Reinecke et al. 1989), none of the previous research has attempted to estimate the proportion of the waste grain that is available for consumption. Physical barriers such as leaves and stems likely limit availability to some grain (Baldassarre and Bolen 1984) and the extent of this obstruction may vary greatly between rice and corn because of the large differences in plant morphology. Furthermore, there is likely a threshold at which food density becomes too low and feeding becomes so inefficient that the amount of energy gained is less than the amount of energy expended, so waterfowl abandon that area (Chamov 1976). Threshold food levels will be dynamic. For example, early in the fall, birds may abandon sites temporarily when high densities of food are still available, but then return to those sites later when food has been depleted in other areas below an initial threshold. At some point however, food density should be reduced to a level that birds will abandon an area permanently (Chamov 1976). This threshold will be an important factor in determining the amount of waste grain actually available to waterfowl and may vary between corn and rice fields as well as other factors such as distance from sanctuary or hunting pressure. Finally, the energetic value of waste grain likely decreases as grain decomposes throughout the winter. Seeds of six species of moist soil plants lost from 10 to 50 % of their mass after being inundated with floodwaters for 120 days (Nelms and Twedt 1996). Moist soil plant seeds in Missouri lost about 13% of their caloric value and mass after being inundated with floodwaters for 150 days (Checkett, pers. com.). Corn and rice kernels likely lose as much or more nutritional value, although the rate between the two likely differs because of structural differences.

Although there is some information available on the quantity of rice and corn left in fields immediately after harvest (Miller et al. 1989, Frederick et al. 1984), this research was carried out in areas where farming techniques and crop productivity likely differ considerably from the Delta, thus quantity of residual grain differs (Frederick et al. 1984). Furthermore, no information is available on the rate this grain is depleted, the proportion of this grain that is unavailable to waterbirds because of physical barriers, the threshold at which it becomes energetically impractical to continue foraging in that area, or the rate grain decomposes and loses its nutritional value. All of these factors will likely vary considerably between rice and corn because of the dramatic differences in the vegetation structure and the "patchiness" of the food source in cornfields (Chamov 1976).

The other two food sources found in flooded grain fields that waterbirds will exploit are invertebrates and moist soil plant (weed) seeds. With the exception of Burton's (in prep.) estimates of moist soil plant seeds and benthic invertebrates, estimates of moist soil plant seeds and invertebrates in rice and corn are nonexistent. Although Burton's (in prep.) research indicates moist soil plant seeds and invertebrates are abundant enough to be an important food source for waterbirds, the research was conducted in a limited number of rice fields on

the Cosumnes Wildlife Reserve, on organically cultivated rice, and is not extensive enough in sample size or varying conditions to accurately represent rice grown in the varying conditions of this project. Availability of moist soil seeds and invertebrate production also likely varies dramatically between winter flooded rice and corn because of the different conditions in which the two are grown and the difference in available substrates for invertebrate production.

We will use two simultaneous approaches in determining the difference between corn and rice in providing quality migration and wintering habitat for waterbirds. First, we will place chicken wire enclosures in randomly selected corn and rice fields to compare food availability, depletion rate, and decomposition rate of grain and moist soil plant seeds, and production of invertebrates between the two field types. Furthermore, because flooded crops may provide habitat for activities other than feeding, for example waterfowl may use flooded fields for roosting or pair formation ponds, the ability of corn and rice fields to serve as habitats for those activities may differ. Therefore, we will also quantify waterbird use and monitor activities in fields containing enclosures during night, when waterfowl feeding occurs most, and during day, to compare quantity and type of waterbird use between the two crop types.

### **Specific Objectives**

- (1) Determine the difference in the quantity of waste grain upon waterfowl arrival in the fall between the two crop types.
- (2) Determine the difference in the depletion rate and food density threshold at which fields are abandoned between the two crop types.
- (3) Determine the difference in the proportion of waste grain present at the time of waterfowl arrival that is available for waterfowl for consumption between the two crop types.
- (4) Determine the difference in invertebrate production between the two crop types.
- (5) Determine the difference in moist soil seed availability between the two crop types.
- (6) Determine the difference in decomposition rate between waste corn and rice inundated with water.
- (7) Determine the difference in the rate of energy acquisition between the two crop types.
- (8) Determine the difference in the amount of energy acquired by waterfowl between the two crop types.
- (9) Determine differences in amount of use by waterbirds between the two crop types.
- (10) Determine differences in behavior of waterbirds using flooded rice and flooded corn.

### *General description*

Immediately after crops are harvested and before waterfowl arrival, 4 paired plots will be randomly selected within each field; one enclosed with chicken wire and one left open will be placed in 10 corn and 10 rice fields. We will then divide fields randomly into two categories. The first category of fields called "seed availability fields" will be sampled once at the time plots are placed in fields and again in spring after at least 90 % of migratory waterfowl are believed to have left the region. At each paired plot in the seed availability fields 4, 15 cm-diameter soil plugs 5 cm deep, will be collected to determine "weed" seed and rice or corn grain availability (Batzer and Resh 1992). We will limit the analysis to those three variables because geese and ducks feed primarily on seeds at this time (Miller 1987). In the other category of fields "intensive study fields", we will sample the open and enclosed plots of 10 (5 corn and 5 rice) for rice, corn, moist soil seeds and benthic invertebrates every 3 weeks after fields are flooded to determine rate of seed depletion and invertebrate production. We will also use these intensive study sites to better address the relationship between depletion rate and waterfowl feeding intensity, and the changes in the threshold of food density at which point waterfowl temporarily abandon an area over the course of the winter by monitoring waterbird densities to correlate depletion rate with bird use. Sample size will be determined from work being conducted in the Mississippi Alluvial Plain (K. Reinecke pers. com.) however, samples from the first year will be used to determine if sample sizes are adequate for the study and adjustments to the sampling protocol will be made accordingly.

Although estimating waste grain in agricultural fields has been done numerous times in past studies, because fields providing habitat for ducks in California are flooded, we are faced with some unique challenges in the methodology for this study. For example, ideally protocol for estimating quantity of waste grain

between rice fields and corn fields would be similar to prevent biases due to the sampling technique. However, because fields in our study will be flooded and, unlike rice, waist grain in cornfields is extremely patchy, because most kernels are still attached to the cob, techniques for estimating waste grain may need to differ between the two field types. Therefore, we will use two different techniques the first or "pilot" year to determine which technique will give us the best probability of addressing the questions of interest.

The first year we will use the 15 cm-diameter plugs described above to estimate both waste corn and rice availability. The first year we will also identify an 8.84 x 4.57m plot in each cornfield called the "ear plot" which we will dike off, remove the water, and collect all ears of corn with at least one grain. At one end of the "ear plot" we will identify a "grain plot" that will be 4.57 x 0.3m. We will identify a similar sized "grain plot" in rice fields and collect and quantify all grain within these plots in both field types. We will then compare results of the plugs and larger plots to determine if plugs give us a biased estimate, assuming larger plots provide a more accurate estimate of grain availability. A framework of more detailed hypotheses to be tested is provided in Attachment F along with experimental methodology for each.

**Data Handling and Storage:** Construction project electronic data will be handled and stored on a secure network and compiled on CD ROM at the Ducks Unlimited, Inc. Western Regional Office on request. All pertinent information gathered, evaluated and applied to the project will be kept in a permanent file at the Western Regional Office of Ducks Unlimited, Inc. and made available to CALFED upon request.

#### Expected Outcomes:

- I. Subsidence:** Reports and analysis of subsidence effects will be included in the final project report. This report will include information on the study area, methods, results, and discussion of the comparison between subsidence on winter-flooded rice and corn. Results will be widely disseminated via Ducks Unlimited's Valley/Bay CARE newsletter and other local and national publications as appropriate. Reports and data will be made available to interested parties and agencies.
- II. Economic Viability:** The economic outcome will be a full accounting of the incentive program, including contracts and payment schedules. A detailed summary of all cooperator costs will be presented and costs broken down into low/medium/high levels for each category of crop production expense (i.e., fertilizer, seed, pesticides, equipment charges, harvest, hauling and drying). Concurrently, returns will be analyzed using crop yield data and price returned. As part of the economic, Ducks Unlimited will work closely with California Rice Commission on marketing outlook and estimates of long-term prices for rice.
- III. Water Quality:** Reports and analysis of water quality testing will be included in the final project report. This report will include information on the study area, methods, results, and discussion of the comparison between discharge water both during summer and spring drawdown of winter-flooded rice and corn. Results will be widely disseminated via Ducks Unlimited's Valley/Bay CARE newsletter and other local and national publications as appropriate. Reports and data will be made available to interested parties and agencies.
- IV. Waterbird Usage:** A detailed report will be provided on the results of the monitoring and assessment described above and in Attachment F. The results will also be used in a Ph D. dissertation and be published in the biological literature as appropriate.

#### Work Schedule:

This demonstration project is a three-year incentive-based project to determine the feasibility of growing rice in the Delta. First year's work will identify property owners with the selection of properties being prioritized to ensure the greatest potential for climatic and soil diversity (milestone). In the second year, the first 5,000 acres will be planted and evaluation of rice production impacts on island subsidence, water quality, waterbird habitat and agronomics will be conducted. This information will be used to change

management activities, implementation and evaluation procedures as needed. In the final year, the remaining acres will be planted, evaluation of island subsidence, water quality, waterbird habitat will continue and we will produce recommendations on the economic feasibility and impacts of producing rice in the region. A detailed list of tasks, subtasks, start/finish dates, linkages and comments are attached as Attachment C.

### **Feasibility:**

The conversion of corn to rice requires normal farming practices, thus there are NEPA/CEQA compliance requirements. There are no land use issues because the land is remaining in agriculture. The project comes under the jurisdiction of the Delta Protection Commission, they will be kept abreast of all project actions. A letter of permission for access is attached for work being conducted on the 1,000 acres currently in production, however, although preliminary discussions indicate we should have no difficulties securing cooperation from other landowners, all work will be conducted on private property, thus permission for access will need to be gained during years two and three. This access permission will be included as part of the sign-up documentation for project cooperators.

Agronomically, most of the landowners have the necessary equipment. Wheat is grown almost universally in the Delta and the equipment used for wheat production will transfer to rice. Some investment in water control structures for the rice checks will be necessary. The corn land will have to be leveled to grow rice. This action will require specialized equipment. The equipment is readily available on a commercial basis. The cost of extra equipment and land leveling is covered in the original sign-up fee of \$250/acres. Advice on growing rice will be supplied by Ducks Unlimited staff using information that is gathered from the pilot project and from rice growers in other areas. Ducks unlimited staff will work closely with the new growers to insure that they use the most up-to-date techniques and carry out the required actions in a timely manner.

**I. Subsidence:** Evaluation of subsidence will be contracted to specialists in conjunction with the California Department of Water Resources, who will be using previously tested and published techniques. Survey and testing equipment will be installed as scheduled in cooperation with participating landowners and should impose minimal constraints on agricultural or recreational activities.

**II. Economic Viability:** The economic research conducted on this project is facilitated by landowner cooperation in tracking all costs associated with land use conversion and associated expenses. Ducks Unlimited, Inc. has qualified staff to research and evaluate all economic issues and concerns related to agronomics.

**III. Water Quality:** Evaluation of water quality will also be contracted to specialists who will be using previously tested and published techniques. Field data and sample collection will be coordinated so they do not interfere with agricultural or recreational activities.

**IV. Waterbird Habitat Quality:** The assessment of the impact on waterbird habitat will be directed by the Central Valley Habitat Joint Venture Evaluation and Monitoring Coordinator. He is familiar with all the techniques being used, which are previously tested and are cited within the body of the proposal. No special status species are involved, and fieldwork is primarily observational so no permits are required.

## **D. Applicability to CALFED ERP Goals and Implementation Plan and CVPIA Priorities.**

### **CALFED ERP Goals:**

GOAL 4: Habitats – Rice in the Delta project represents an opportunity to convert a large expanse of Delta habitat to more closely resemble seasonal flooded wetlands by converting current crop types to rice production. Islands converted to rice production will increase waterbird habitats and provide a predictable food source for migratory waterfowl and shorebirds. This process will also help to maintain the physical characteristics of the Delta for the long-term by reducing subsidence.

**CVPIA Priorities:** This project addresses priorities/considerations for migratory waterfowl and shorebirds, and their associated habitats in the CVPIA focus area of Sacramento – San Joaquin Delta.

This project will result in progress toward the following **Biological Resource Considerations** for waterfowl and shorebirds and migratory birds:

- Addresses the limitations of quality habitat by an increase of functional wetlands through farmland conversion to rice production.
- Addresses immediate and long-term benefits by creating an economic incentive among Delta farmers to convert row-irrigated crops to rice production to decrease island subsidence and maintain levee integrity.

This project will result in progress toward the following **Implementation Considerations**:

- The project is designed to be a continuing program supported by economic incentives. The outcome of the project will provide an understanding of economic and land use benefits of converting row-irrigated crops to rice production on Delta islands that will create an incentive for farmers to implement ongoing conversion.
- The project is supported by public/private technical expertise that will ensure that the best known science and technical knowledge will be utilized in accomplishing the goals and objectives of the project.
- The project has local landowner support. The demonstration project is being conducted on local farmland. The landowner is very interested in the outcomes of this pilot project and hopes to find future economic and land use stability for his farming operations in the Delta; The project is also strongly supported by the Bay Delta Commission. The Commission is committed to maintaining a stable agricultural base in the Delta and compatible ecosystem management practices.
- The project is highly compatible with other plans and programs for fishery restoration and protection.

This project will result in progress in **Economic Considerations** by addressing the following:

- The outcomes of this project will be provide important cost/benefit information regarding the benefits of rice production on Delta islands to help decrease island subsidence and increase waterfowl habitat. The project is designed to build greater economic stability into farming operations in the Delta and provide increased stability to levee integrity and the economic base to assist in maintaining the levees.

### **Relationship to Other Ecosystem Restoration Projects:**

Rice in the Delta is intended to reduce island subsidence and support levee integrity. The vulnerability of the Delta levee system to failure is a great concern for wetlands and restored rearing habitat for Delta fisheries. Current wetland restoration projects would potentially suffer permanent loss from flood inundation. Large plant communities and waterbird habitat would be lost. Additionally, fishery restoration efforts dedicated to rearing habitat in the Delta would be highly impacted by saltwater intrusion and ecological imbalance.

### **Requests for Next-Phase Funding:**

Non-applicable

Previous Recipients **of CALFED** or CVPIA funding:

Please see detailed list on Cover Sheet for CALFED and CVPIA funding list.

System-Wide Ecosystem Benefits:

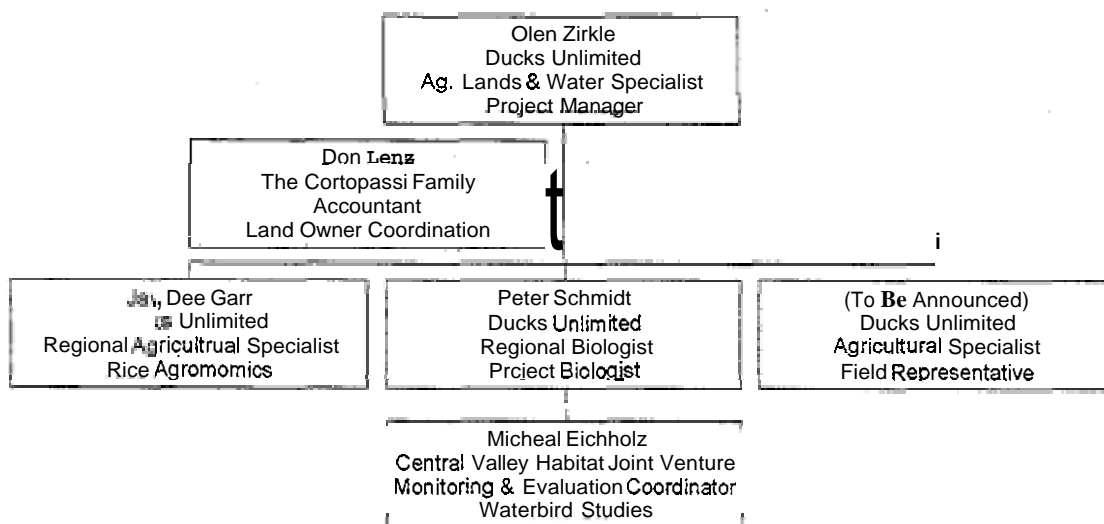
The project holds a great opportunity to develop a beneficial crop that will increase the economic base for farming operations in the Delta and preserve and improve the Delta's physical characteristics and processes. Maintaining island stability in the Delta increases the level of flood protection by maintaining levee stability. The benefits of an improved Delta levee system include greater protection to wildlife habitat and water quality. Levee failure would increase inundation of salt water and would allow salinity to intrude further upstream into the Delta.

## E. Qualifications

# ORGANIZATION CHART

## Rice In The Delta

*A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality*



Name *	Role/Responsibility	Availability	Conflict of Interest	Comment
Olen Zirkle	Proj. Mgt./Oversight Landowner Outreach Agronomic/Economic Analysis	Available as needed as required by Project	None	Ducks Unlimited Employee
Peter Schmidt	Project Biologist, Manage monitoring Programs, Analysis, Reporting	Available as needed as required by Project	None	Ducks Unlimited Employee
Jay Dee Garr	Rice Specialist, Assist in advising landowners on rice production techniques	Available as needed as required by Project	None	Ducks Unlimited Employee
Mike Eichholz	Manager waterbird monitoring project, analysis, reporting	Available as needed as required by Project	None	FWS agency employee
Field Representative	Work with landowners on all conversion issues, collect data on agronomics, economics water quality and subsidence	Available as needed as required by Project	None	Ducks Unlimited Employee
Don Lenz	Assist Proj. Mgr. On economic issues, coordinate with pilot project landowner.	Available as needed Subject to notice	None	Cortopassi Family Employee

\* Detailed qualifications and contributions listed in Attachment E.

**F. Cost** (Attachment D – Annual and Total Budget)

Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality

**1. Budget Detail:** (See Attachment “E” – Annual and Total Budget)

Salaries: DU’s Salaries are divided into three classes. The executive class, the professional class and the technician class. Pay rate including FICA for each class is as follows:

Executive: ~~\$55.00/hour~~ Professional: \$35.00/hour Technician: \$24.00

Task one is calculated at the technician rate for all three years. Task one includes 1400 hours for an agronomic field technician, 200 hours for an agricultural/rice specialist. Task two contains 833 hours per year at the professional rate for a monitoring manager. A graduate student on a grant to a cooperating university will assist in managing and conduct a large portion of the field work. Task three and four include 340 hours each for the field technician to setup and carryout the monitoring for water quality and subsidence. . Benefits vary per class, but average 20% overall.

Travel: Travel for task one includes mileage for the field technician and the agricultural specialist, meals for each when attending meetings and lodging for overnight stays for the agricultural specialist when visiting the project from his home base in Colusa. Travel for task two includes auto expenses for the monitoring manager and for the student technicians that will be supplied by DU. Travel for tasks three and four include monthly site visits to sample water quality and subsidence. Travel for project management includes mileage and meals for site visits and meeting attendance. The travel calculations were assumed to be the same for all three years of the project. Travel was calculated at 0.325/mile. Meals and lodging were calculated at \$100/day combined, lodging at \$60/day and meals at \$40/day. Single event meals with no overnight stay were calculated at \$10/day.

Supplies **and** expendables: DU calculates the supplies and expendables category using a flat rate of \$18.00/hour. This rate is applied equally across all three classes of employees and includes compensation and fringe benefits for local administrative staff support, direct local office costs, and direct National Head Quarter’s conservation support costs and were calculated using the Direct Allocation Method under the federal accounting regulations.

Service Contracts: Included within the service contract calculations is a one-time fee of \$250/acre for conversion from corn land to rice land in years one and two (5,000 acres in each year). This fee covers the cost of laser leveling and installation of the rice checks. Additionally, an annual fee of \$50/acre was calculated in years two and three for the management and cost associated with winter flooding of the rice lands. Service contracts for water quality include fees for running lab tests. The field technician will take the samples. Service contracts for subsidence monitoring include fees for a consultant to install and operate test equipment, obtain field samples, and analyze collected data.

Service contracts for task 2 (Water Bird Assessment) includes hiring part time technicians at \$11/hour to census and monitor water bird behavior, collect and sort “soil plugs”, collect and quantify grain samples from fields, including water column invertebrates sampled. The breakdown on time/expense is: Sorting six samples annually from two field types, 5 fields of each type, and three plots in each field for a total of 180 samples @ 2 hours/ sample totaling 360 hours of labor. Rice and corn grain plots for food availability fields: Two samples annually from two field types, 5 fields of each type, and 1 plot in each field for a total of 20 samples @12 hours/sample totaling 240 hours of labor. Corncoobs from food availability fields:

Two samples annually from 1 field type, 5 fields of each type, with 1 plot per field for a total of 10 samples @ 10 hours/sample totaling 100 hours of labor. Rice and corn grain plots for intensive study fields: Six samples annually on two field types, 5 fields of each type, with 1 plot per field for a total of 60 samples @ 12 hours/sample totaling 720 hours of labor. Corn cobs from intensive study fields: Six samples annually from 1 field type, 5 fields of each type, with 1 plot per field for a total of 30 samples @ 10 hours/sample totaling 300 hours of labor. Plugs from open plots for grain, moist soil plant seeds, and invertebrates in intensive study fields: Six samples annually in two field types for, 5 fields of each type, in 3 plots, removing 4 plugs from each plot, totaling 720 plugs @ 3 hours/plug totaling 2,100 hours of labor. Plugs from closed plots for grain, moist soil plant seeds, and invertebrates in intensive study fields: Six samples annually in two field types for, 5 fields of each type, in 3 plots, removing 4 plugs from each plot, totaling 720 plugs @ 4 hours/plug totaling 2,880 hours of labor. Plugs from open and closed plots for grain and moist soil plant seeds in food availability fields: Two samples annually in two field types for, 5 fields of each type, 2 types of plot in each field with 3 plots of each type, removing 4 plugs from each plot, totaling 480 plugs @ 2 hours/plug totaling 960 hours of labor. Nocturnal census and behavior observations in intensive study fields: 10 sites at 1, 2-hour observation every 3 days at each site for 150 days totals 50 observations/site totaling 1,000 hours of labor. Nocturnal census and behavior observations in food availability fields: 10 sites at 1, 2-hour observation every 10 days at each site for 150 days totals 15 observations/site totaling 300 hours of labor. Daylight census and behavior observations: 20 sites at 1, 4-hour observation every 10 days at each site for 150 days totals 15 observations/site, totaling 1,200 hours of labor. Grain decomposition: Six samples annually for first 2 years only, 2 field types, 5 fields of each type, 3 plots in each field for a total of 180 samples.

**Equipment:** It is estimated that the project will need a computer and digital projector for Power Point presentations. The estimated costs are \$4,000 for the computer, \$3,000 for the projector. An additional \$1,000 was budgeted for a digital camera to document the agronomic practices for later presentations. An additional \$1,000 was budgeted in year two and three for yet to be determined equipment uses. Water quality monitoring will require \$1,500 for hand-held data collection equipment. Estimated costs for subsidence assessment include \$145,000 for ground-based monitoring equipment and \$82,000 for carbon and methane flux testing instruments.

Equipment for task two includes:

Night vision scopes	2	@ \$5,000	\$ 10,000
Dissecting Scopes	2	@ \$2,000	\$ 4,000

**Overhead rate:** The indirect overhead rate has been approved by the Department of Agriculture with no modifications. The rate, 13.55% may be applied to all costs on the projects (including salary, materials, subcontract charges, etc.). The rate includes information service expenses, office services expenses, meeting and conference expense, government relations expenses and program G&A expenses. Full details of all allowable charges are on file at the Western Regional Office of Ducks Unlimited, Inc.

**Project Management:** Project management includes 100 hours of executive oversight and 400 hours of direct supervision, 200 hours financial reporting and 200 hours for contact compliance and legal work per year. Benefits vary per class, but average 20% overall.

## 2. Cost Sharing

There is no direct cost-sharing on the project expense from outside sources, however, the Cortopassi Family has completed an initial study of economic costs and has planted and maintained the pilot project for two years. Much of the agronomic and economic information used to present the workshops will originate from this like-kind match.

## **G. Local Involvement - Public Outreach Plan**

**Identification of Outreach Area:** Sacramento and San Joaquin Counties - Sacramento-San Joaquin Delta

**Identification of Key Stakeholders, Local Involvement and Interested Parties:** Delta Protection Commission, Reclamation and Levee Districts, yet to be identified farmers and landowners within Sacramento and San Joaquin Counties.

**Background:** Sacramento and San Joaquin Counties represent significant farmlands with the legal Delta boundary. Because this region of the Delta is predominately farmlands, a number of active Reclamation and Levee Districts tie landowners together to manage drainage and levee systems in their jurisdictions. Presently, the Delta Protection Commission, a state agency created under legislation, has been formed to address the increasing pressures for residential, residential/recreation and commercial industrial use that is encroaching into Delta that threatens to convert significant farmlands into inappropriate uses. The Commission is charged with preparation of a regional plan for the "heart" of the Delta. The plan is to address land uses and resource management for the Sacramento - San Joaquin Delta. Key land uses are identified in the legislation and include: agriculture, wildlife habitat and recreation. This plan has been forwarded to five regional Delta counties to be incorporated into their General Plans. The Delta Protection Commission has appeal authority over local government actions. Jurisdiction: The legal boundaries of the Delta including Solano, Yolo, Sacramento, San Joaquin and Contra Costa counties.

**Outreach Strategy:** This project is born out of landowner outreach to Ducks Unlimited, Inc. to research and develop rice production in the Delta. The Cortopassi family, a farming company in the Delta, landowners on Brack Tract, will plant 1,000 - 1,500 acres of rice as a pilot project to demonstrate the feasibility of rice production, winter flooding up of fields for rice straw decomposition and to research agronomic and economic data that will provide other Delta growers incentives to sign up to convert their crop types from corn to rice. To date, this land has been prepared and planted and will serve as a demonstration project to enlist other owner/operators to make the conversion. Economic incentives will be offered to enlist Delta farmlands in rice production and encourage operators to participate in on-going research and evaluation to promote long-term crop sustainability and adaptive management techniques. Approval and support from the Delta Protection Commission has been obtained together with a future commitment to be a key participant in the Rice in the Delta project.

A Steering Committee will be set up comprised of key stakeholders, i.e., representatives from the Delta Protection Commission, individual farmers, Reclamation and Levee District representatives, county government, state and federal resource managers, other interested individuals and conservation groups. The following three-year plan is designed to enlist 10,000 acres in rice production and winter flooding programs (rice straw decomposition):

- 1<sup>st</sup> Year: Compile Delta landowner list and survey landowners concerning crop conversion and incentive program benefits. Determine issues and concerns. Depending on area of concentrated landowner interest, conduct workshop in to present the following: (1) Agronomic and economic data concerning rice production; (2) Evaluations and assessments from monitoring demonstration project; and, (3) Rice in the Delta Incentive Program to interested farmers. From the workshop information, compile a list of landowners interested in signing up acreage for the program (1<sup>st</sup> Year Goal: 5,000 acres). Begin land preparation and conduct site visits with other interested farmers.
- 2<sup>nd</sup> Year: Plant enlisted land from 1<sup>st</sup> year. Hold second public workshop to present the following (1) project-related agronomic and economic data from first year crop converted farmlands; (2) Evaluations and assessments from second year monitoring of demonstration project; and, (3) Re-introduction to the Rice in the Delta Incentive Program. Develop an additional 5,000 acres of enlisted farmlands to plant in rice (2<sup>nd</sup> Year Goal: 5,000 acres). Begin land preparation.
- 3<sup>rd</sup> Year: Plant enlisted land from 2<sup>nd</sup> year. Hold third public workshop to present the following (1) project-related agronomic and economic data from first year crop converted farmlands; (2) Evaluations and

assessments from second year monitoring of demonstration project; and, (3) Re-introduction to the Rice in the Delta Incentive Program.

**Outcome:** 10,000 acres of farmlands converted to rice production and a winter flooding program. Sufficient data and community outreach to support on-going incentive to continue this program for the purpose of reaching the goals and objectives of the project.

**Third Party Impacts:** None

**SAN TOMO PARTNERS**

11292 North Alpine Road  
Stockton, CA 05212

<b>FACSIMILE TRANSMISSION</b>	<b>Total Number of Pages: 2 (Including this one)</b>
<b>To: Olen Zirkle</b>	<b>From: Donald G. Lenz</b>
<b>Subject: CALFED Grant</b>	<b>Contact Person:</b>
<b>Date: May 15, 2000</b>	<b>Phone: 209/948-0792</b>
<b>Fax: 916/ 852-2200</b>	<b>Fax: 209/333-0938</b>

**COMMENTS:****Personal & Confidential**

Pursuant to your request, attached is a letter signed by Dean A. Cortopassi regarding access to his property at the Brack Tract for Duck\$ Unlimited's CALFED proposal. Contact me if you have any questions or require additional information.

<p align="center"><b>CONFIDENTIALITY NOTICE</b></p> <p>This facsimile transmission is intended only for the use of the individual or entity named above and may contain information that is confidential, privileged, and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or use of any of the information contained in this transmission is strictly PROHIBITED. If you have received this transmission in error, please immediately notify us by telephone and mail the original transmission to us at the above address. Thank you.</p>
--



DEAN A. CORTOPASSI

May 12, 2000

**CALFED BAY-DELTA PROGRAM**  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814.

Dear Sirs:

My wife and I are the owners of Live Oak Investors, Inc. ("LOI"). LOI's land is located on Brack Tract and we are currently converting our corn acreage to rice production.

I have been contacted by Ducks Unlimited ("DU") on their CALFED Proposal regarding planting rice in the Delta. DU plans to use my rice land as a pilot project during the first year of the project. I fully support DU's proposal and look forward to participating in the proposed actions when approved for funding.

I understand that DU, their consultants, and certain project-essential agency personnel will be visiting my property for the purpose of implementing their research. Provided that I (or my designees) receive adequate notice, I will grant access to DU for purposes of DU's research project.

I understand that the project involves monitoring and I authorize that activity as part of the approved project.

Thank you for considering this important project.

Sincerely,

Dean A. Cortopassi



**Cosumnes River Preserve**

13501 Franklin Boulevard

Galt, California 95632

916.684.2816 ■ telephone

916.683.1702 ■ facsimile

info@cosumnes.org

w.cosumnes.org

May 9, 2000

Peter Schmidt  
Ducks Unlimited  
Western Regional Office  
3074 Gold Canal Drive  
Rancho Cordova CA 95670

Dear Pete:

In order to better understand the dynamics of wintering waterfowl and other waterbirds in the Delta I am offering my support to Ducks Unlimited to conduct monitoring on our property in conjunction with your CALFED project. I understand the duration of ~~this~~ project will be 3 years.

I understand that both daytime and nighttime surveys for waterbirds will be conducted as outlined in the proposed monitoring plan, and will not interfere with our agricultural or recreational activities. In addition, you may place 4 wire exclosures in mutually agreeable locations for waste grain and seed biomass sampling.

Sincerely

Rick Cooper  
Preserve Manager

**Cooperators**

Bureau of Land Management ■ Ducks Unlimited ■ California Department of Fish and Game ■ California Department of Water Resources  
California Wildlife Conservation Board ■ County of Sacramento, Department of Regional Parks, Recreation and Open Space ■ PacTrust ■ The Nature Conservancy



DUCKS  
UNLIMITED  
INC.

DUCKS UNLIMITED, INC.  
WESTERN REGIONAL OFFICE  
3074 Gold Canal Drive  
Rancho Cordova, California 956704116  
19161852-2000  
(916) 852-2200 Fax

May 11,2000

Sacramento County  
Planning and Community Development Department  
827 7<sup>th</sup> Street, Room 230  
Sacramento, CA 95814

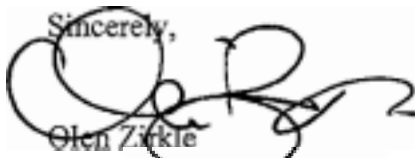
Dear Sirs:

Ducks Unlimited is participating in this year's CALFED Proposal Solicitation Program for Ecosystem Restoration Projects and Programs. As stated in the Solicitation Package, we are required to notify the clerk of the Board of Supervisors of the county in which our project is located and supply a copy of the proposal.

We are pleased to submit a copy of our proposal titled "Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality". This proposal requests funds set up a pilot demonstration project to plant delta lands to rice production and study the effect of rice culture on wildlife benefits, subsidence of peat soils and water quality.

If approved, work on obtaining agronomic information and setting up grower workshops will begin during the summer and fall of 2001. The studies on water quality, wildlife benefits and subsidence will begin on existing rice planted on Brack Tract and expanded to new rice acreage, including Sacramento County, planted under the program.

If you have any questions or concerns regarding the CALFED process or the proposed construction project, please feel free to call.

Sincerely,  
  
Glen Zinkle  
Land and Water Specialist



DUCKS  
UNLIMITED  
INC.

DUCKS UNLIMITED, INC.  
WESTERN REGIONAL OFFICE  
3074 Gold Canal Drive  
Rancho Cordova, California 95670-6116  
(916) 852-2000  
(916) 852-2200 Fax

May 11, 2000

San Joaquin County  
Community Development Department  
Development Planning Division  
1810 East Hazelton Ave.  
Stockton, CA 95205

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Land and Water Specialist



DUCKS  
UNLIMITED  
INC.

DUCKS UNLIMITED, INC.  
WESTERN REGIONAL OFFICE  
3074 Gold Canal Drive  
Rancho Cordova, California 95670-6116  
(916) 852-2W0  
(916) 852-2200 Fax

May 11, 2000

San Joaquin County  
Clerk of the Board of Supervisors  
Courthouse, Room 701  
222 East Weber Avenue  
Stockton, CA 95202

Madam Clerk

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Glen Zinkle  
Land and Water Specialist



DUCKS UNLIMITED, INC.  
WESTERN REGIONAL OFFICE  
3074 Gold Canal Drive  
Rancho Cordova, California 95670-6116  
(916) 852-2000  
(916) 852-2200 Fax

May 11, 2000

Sacramento County  
Clerk of the Board of Supervisors  
700 H Street, Room 2450  
Sacramento, CA 95814

Madam Clerk:

Ducks Unlimited is participating in this year's CALFED Proposal Solicitation Program for Ecosystem Restoration Projects and Programs. **As** stated in the Solicitation Package, we are required to notify the clerk of the Board of Supervisors of the county in which our project is located and supply a copy of the proposal.

We are pleased to submit a copy of our proposal titled: "Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality". This proposal requests funds set up a pilot demonstration project to plant delta lands to rice production and study the effect of rice culture on wildlife benefits, subsidence of peat soils and water quality.

If approved, work on obtaining agronomic information and setting up grower workshops will begin during the summer and fall of 2001. The studies on water quality, wildlife benefits and subsidence will begin on existing rice planted on Brack Tract and expanded to new rice acreage, including Sacramento County, planted under the program.

If you have any questions or concerns regarding the CALFED process or the proposed construction project, please feel free to call.

Sincerely,  
  
Olen Zirkle  
Land and Water Specialist



DUCKS UNLIMITED, INC  
WESTERN REGIONAL OFFICE  
3074 Gold Canal Drive  
Rancho Cordova, California 95670-6116  
(916) 852-2000  
(916) 852-2200 Fax

May 11, 2000

Margit Aramburu, Executive Director  
Delta Protection Commission  
14215 River Road  
P.O. Box 530  
Walnut Grove, CA 95690


Dear Ms Aramburu:

Ducks Unlimited is participating in this year's CALFED Proposal Solicitation Program for Ecosystem Restoration Projects and Programs. As stated in the Solicitation Package, we are required to notify the clerk of the Board of Supervisors of the county in which our project is located and supply a copy of the proposal.

We are pleased to submit a copy of our proposal titled: "Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality". This proposal requests funds set up a pilot demonstration project to plant delta lands to rice production and study the effect of rice culture on wildlife benefits, subsidence of peat soils and water quality.

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Sincerely,  
  
Olen Zirkle  
Land and Water Specialist

If yes, the applicant must attach written permission for access from the relevant property owner(s). Failure to include written permission for access may result in disqualification of the proposal during the review process. Research and monitoring field projects for which specific field locations have not been identified will be required to provide access needs and permission for access with **30** days of notification of approval.

6. Please indicate what permits **or** other approvals may be required **for** the activities contained in your proposal. Check all boxes that apply.

**LOCAL**

Conditional use permit	_____
Variance	_____
Subdivision Map Act approval	_____
Grading permit	_____
General plan amendment	_____
Specific plan approval	_____
Rezone	_____
Williamson Act Contract cancellation	_____
Other _____	
(Please Specify)	
None required	<u>  X  </u>

**STATE**

CESA Compliance	_____	(CDFG)
Streambed alteration permit	_____	(CDFG)
CWA § 401 certification	_____	(RWQ CB)
Coastal development permit	_____	(Coastal Commission/BCDC)
Reclamation Board approval	_____	
Notification	_____	(DPC, BCDC)
Other _____		
(please specify)		
None required	<u>  X  </u>	

**FEDERAL**

ESA Consultation	_____	(USFWS)
Rivers & Harbors Act permit	_____	(ACOE)
CWA § 404 permit	_____	(ACOE)
Other _____		
(please specify)		
None required	<u>  X  </u>	

DPC = Delta Protection Commission  
 CWA = Clean Water Act  
 CESA = California Endangered Species Act  
 USFWS = U.S. Fish and Wildlife Service  
 Comm.  
 ACOE = U.S. Army Corps of Engineers

ESA = Endangered Species Act  
 CDFG = California Department of Fish and Game  
 RWQCB = Regional Water Quality Control Board  
 BCDC = Bay Conservation and Development

# Land Use Checklist

***RICE IN THE DELTA: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality***

All applicants must fill out this Land Use Checklist for their proposal. Applications must contain answers to the following questions to be responsive and to be considered for funding. Failure to answer these questions and include them with the application will result in the application being considered nonresponsive and not considered for funding.

1. **Do** the actions in the proposal involve physical changes to the land (**i.e.** grading, planting vegetation, **or** breaching levees) **or** restrictions in land use (**i.e.** conservation easement **or** placement of land in a wildlife refuge)?

X  
YES

            
NO

2. If **NO** to #1, explain what type of actions are involved in the proposal (**i.e.**, research only, planning only).

N/A

3. If **YES** to #1, what is the proposed land use change **or** restriction under the proposal?

Re-level delta lands for rice production

4. If **YES** to #1, is the land currently under a Williamson Act contract?

X  
YES

            
NO

5. If **YES** to #1, answer the following:

Current land use: Agricultural  
Current zoning: Agricultural  
Current general plan designation: Agricultural

6. If **YES** to #1, is the land classified as Prime Farmland, Farmland of Statewide Importance **or** Unique Farmland **on** the Department of Conservation Important Farmland Maps?

            
YES

            
NO

X  
DON'T KNOW

7. If **YES** to #1, how many acres of land will be subject to physical change or land use restrictions under the proposal?

10,000 acres of land

8. If **YES** to #1, is the property currently being commercially farmed or grazed?

X  
YES

        
NO

9. If **YES** to #8, what are: # of employees/acre: To be determined, (Tenant Farmed) Third Party  
total # of employees: To be determined, (Tenant Farmed) Third Party

10. Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)?

        
YES

X  
NO

11. What entity/organization will hold the interest? N/A

12. If **YES** to #10, answer the following:

Total number of acres to be acquired under proposal: N/A  
Number of acres to be acquired in fee: N/A  
Number of acres to be subject to conservation easement: N/A

13. For all proposals involving physical changes to the land or restriction in land use, describe what entity or organization will:

Manage the property: Landowner  
Provide operations and maintenance service: Landowner  
Conduct monitoring: Ducks Unlimited, Inc.

14. For land acquisitions (fee title or easements), will existing water rights also be acquired?

N/A  
YES

N/A  
NO

15. Does the applicant propose any modifications to the water right or change in the delivery of the water?

        
YES

X  
NO

16. If **YES** to #15, describe: N/A

## STATE AND FEDERAL FORMS

### *Rice in the Delta:*

*A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.*

### **STATE FORMS:**

1. Nondiscrimination Compliance Statement – **ATTACHED**  
(for public, private and nonprofit applicants **only**)
2. Proof of Contractors License – **(To be submitted when a Contractor is hired for this project)**  
(for private and nonprofit applicants proposing construction projects)
3. Non-collusion Affidavit – **(To be submitted when a Contractor is hired for this project)**  
(for public, private and non-profit applicants proposing construction projects)
4. Bidders Bond - **(To be submitted when a Contractor is hired for this project)**  
(for private and non-profit applicants proposing construction projects)
5. Payment Bond - **(To be submitted when a Contractor is hired for this project)**  
(for private and non-profit applicants proposing construction projects)
6. Performance Bond - **(To be submitted when a Contractor is hired for this project)**  
(for private and non-profit applicants proposing construction projects)

### **FEDERAL FORMS:**

1. Standard 424 – **ATTACHED**  
(for all applicants except federal agencies)
2. Assurances - Construction Programs - **ATTACHED**

**NONDISCRIMINATION COMPLIANCE STATEMENT**

STD. 19 (REV. 3-95)

**RICE IN THE DELTA** A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.

COMPANY NAME

Ducks Unlimited, Inc.

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990(a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave.

**CERTIFICATION**

*I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.*

OFFICIAL'S NAME

Ronald A. Stromstad

DATE EXECUTED

4/26/00

EXECUTED IN THE COUNTY OF

Sacramento

PROSPECTIVE CONTRACTOR'S SIGNATURE



PROSPECTIVE CONTRACTOR'S TITLE

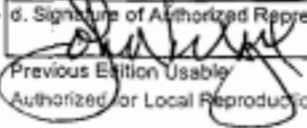
Director of Operations

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Ducks Unlimited, Inc.

# APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

		2. DATE SUBMITTED 5/15/00	Applicant Identifier N/A
1. TYPE OF SUBMISSION <input type="checkbox"/> Application <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction		3. DATE RECEIVED BY STATE N/A	State Application Identifier N/A
<input type="checkbox"/> Preapplication <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier
5. APPLICANT INFORMATION			
Legal Name: <b>Ducks Unlimited, Inc.</b>		Organizational Unit: <b>Western Regional Office</b>	
Address (give city, county, State, and zip code): <b>3074 Gold Canal Drive Rancho Cordova, CA 95670-6116</b>		Name and telephone number of person to be contacted on matters involving this application (give area code): <b>Olen Zirkle (916)852-2000</b>	
6. EMPLOYER IDENTIFICATION NUMBER (EIN): <b>13-5643799</b>		7. N P E OF APPLICANT: (enter appropriate letter in box) <div style="display: flex; justify-content: space-between;"> <div> A. State E. County C. Municipal D. Township E. Interstate F. Intermunicipal G. Special District </div> <div> H. Independent School Dist. I. State Controlled Institution of Higher Learning J. Private University K. Indian Tribe L. Individual M. Profit Organization N. Other (Specify) <u>Non-profit</u> </div> </div>	
8. TYPE OF APPLICATION <input type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision If Revision, enter appropriate letter(s) in box(es) <input type="checkbox"/> <input type="checkbox"/> A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify): _____		9. NAME OF FEDERAL AGENCY:	
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: <div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div>		11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: <b>Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.</b>	
12. AREAS AFFECTED BY PROJECT (Cities, Counties, States, etc.): <b>San Joaquin and Sacramento Counties</b>			
13. PROPOSED PROJECT	14. CONGRESSIONAL DISTRICTS OF: <b>Richard Pombo</b>		
Start Date <b>4/1/01</b>	Ending Date <b>3/31/04</b>	a. Applicant <b>4th District</b>	
		b. Project <b>11th District</b>	
15. ESTIMATED FUNDING:		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?	
a. <b>6,339,498</b>		a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:  DATE _____	
b. Applicant		b. No. <input type="checkbox"/> PROGRAM IS NOT COVERED BY E. O. 12372 <input type="checkbox"/> OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW	
c. State			
d. Local			
e. Other			
f. Program Income			
g. TOTAL	<b>6,339,498</b>	17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT? <input type="checkbox"/> Yes If "Yes," attach an explanation. <input checked="" type="checkbox"/> No	
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.			
a. Type Name of Authorized Representative <b>Ronald A. Stromstad</b>		b. Title <b>Director of Operations</b>	
c. Telephone Number <b>(916)852-2000</b>		e. Date Signed <b>5-15-00</b>	
d. Signature of Authorized Representative 			

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Standard Form 424 (Rev. 7-97)  
Prescribed by OMB Circular A-102

# BUDGET INFORMATION- Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY						
Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Delta Rice Project		\$	\$	\$ 6,339,498	\$	\$ 6,339,498
2.						
5.. Totals		\$	\$	\$ 6,339,498	\$	\$ 6,339,498

SECTION B - BUDGET CATEGORIES					
6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1)	(2)	(3)	(4)	(5)
a. Personnel	\$ 306,200	\$	\$	\$	\$ 306,200
b. Fringe Benefits	61,240				61,240
c. Travel	59,750				59,750
d. Equipment	265,200				265,200
e. Supplies	211,302				211,302
f. Contractual	4,655,474				4,655,474
g. Construction					
h. Other Graduate Student	63,000				63,000
i. Total Direct Charges (sum of 6a-6h)	5,622,166				5,339,498
j. Indirect Charges	717,332				717,332
k. TOTALS (sum of 6i and 6j)	\$ 6,339,498	\$	\$	\$	\$ 6,339,498
7. Program Income	\$	\$	\$	\$	\$

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SECTION C - NON-FEDERAL RESOURCES					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS	

8. Delta Rice Project	\$	None	\$	None	\$	None
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9.						
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10.						
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11.						
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12. TOTAL (sum of lines 8-11)	\$	None	\$	None	\$	None
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SECTION D - FORECASTED CASH NEEDS						
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
13. Federal	\$ 2,745,569	\$ 200,000	\$ 400,000	\$ 1,700,000	\$ 445,569	
14. Non-Federal						

15. TOTAL (sum of lines 13 and 14)	\$ 2,745,569	\$ 200,000	\$ 400,000	\$ 1,700,000	\$ 445,569	
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SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT					
(a) Grant Program	FUTURE FUNDING PERIODS (Years)				
	(b) First	(c) Second	(d) Third	(e) Fourth	
16. Year 2	\$ 120,000	\$ 120,000	\$ 2,000,000	\$ 120,000	
17. Year 3	120,000	120,000	800,000	193,155	

18.						
-----	--	--	--	--	--	--

19.						
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20. TOTAL (sum of lines 16-19)	\$	240,000	\$ 240,000	\$ 2,800,000	\$ 319,929	
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SECTION F - OTHER BUDGET INFORMATION		
21. Direct Charges:	\$5,622,166	
22. Indirect Charges:	\$717,332	

NO. 1 10/11/10

**ASSURANCES - CONSTRUCTION PROGRAMS**

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (03480042). Washington, DC 20503.

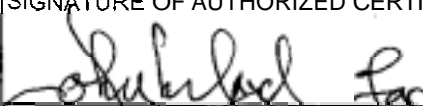
**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

**NOTE** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title, or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal interest in the title of real property in accordance with awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progress reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 5794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.
14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL  Ronald A. Stromstad	TITLE Director of Operations
APPLICANT ORGANIZATION Ducks Unlimited, Inc.	DATE SUBMITTED 5/15/00

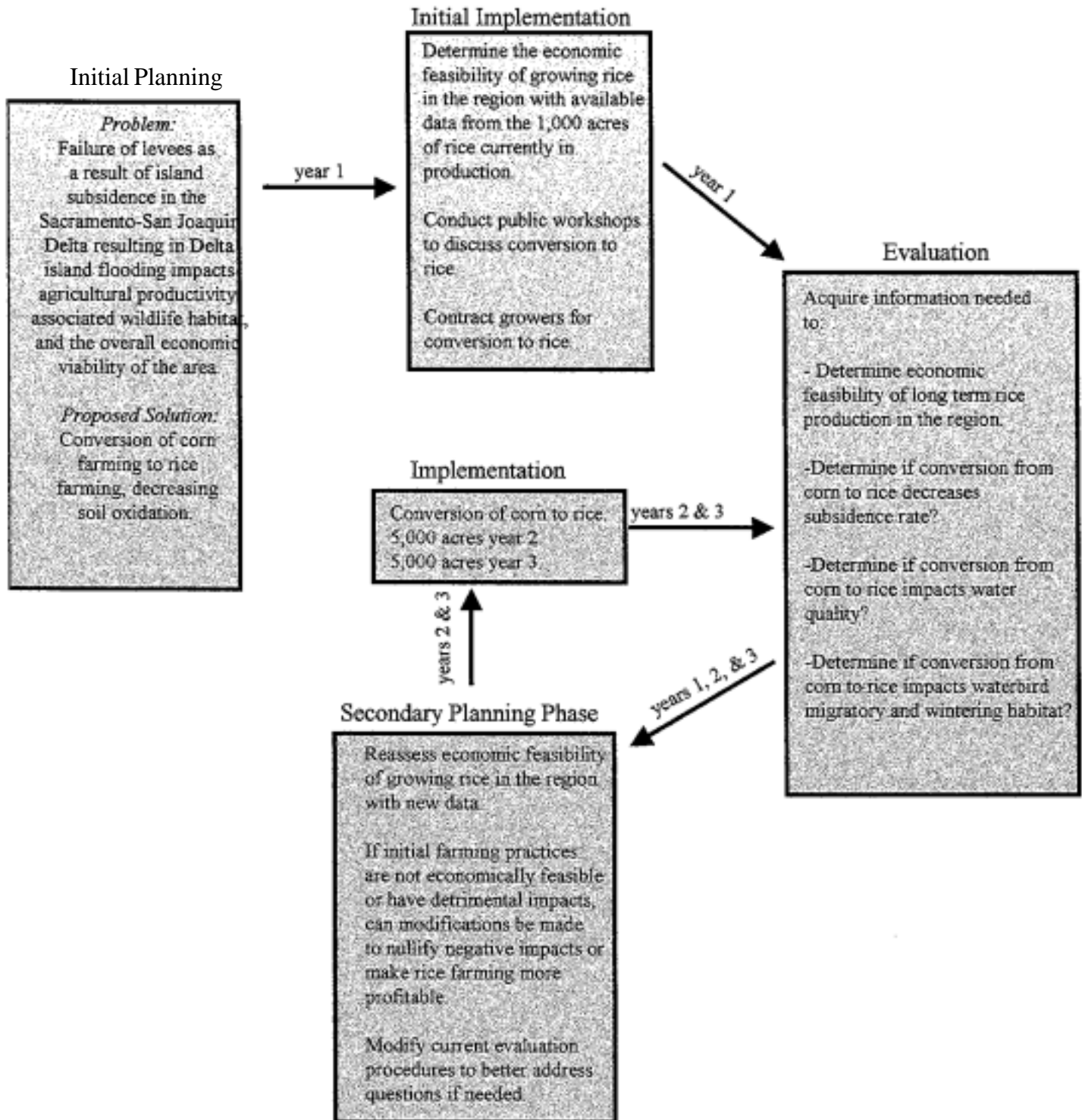
## I. Literature Cited

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**Rice in the Delta:** A pilot/demonstration project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on island subsidence, agronomics, water quality, and wildlife habitat.



**DUCKS UNLIMITED FY 2000 CALFED PROJECT PROPOSAL – Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.**

Year	Task	Task Description	Start/Finish Date	Linkage	Comments
Delta Rice Project	1.0	Conversion of 10,000 acres of Delta lands to rice production	April 1, 2001 – March 31, 2004		Convert 10,000 acres over a three year period with adequate monitoring and adaptive management
Year 1:	Subtask 1.1.1	Work with current rice growers to develop agronomic and economic data	April 1, 2001-August 31, 2001	A	Current rice acreage totals 1000 acres and will serve as a pilot project
	Subtask 1.1.2	Prepare information for public workshops with Delta growers	July 1, 2001-September 30, 2001	A	Information from first year and previous two years will be used from pilot project
	Subtask 1.1.3	Hold public workshop to discuss conversion to rice production, develop list of interested growers	October 1-15, 2001	A	Workshop numbers may be increased pending grower interest and availability
	Subtask 1.1.4	Contract growers from workshop list, sign-up growers interested in the Project	October 15, 2001-December 31, 2001	B	Growers will be required to sign a three year commitment letter to grow rice
	Subtask 1.1.5	Prepare 5,000 acres of Delta lands for rice-production that meet Project Goals and Objectives	October 1, 2001-March 31, 2002	B	Some land leveling and preparation may take place into 2002 but will be completed before expected planting date of April-May, 2002
Year 2:	Subtask 1.2.1	Review final agronomic monitoring from year 1 pilot project/land preparation; Update agronomic/economic data	January 1, 2002- March 31, 2002	A	Information from the first year pilot project will be included into agronomic information for growers before spring planting season
	Subtask 1.2.2	Plant 5,000 acres of rice	April 1-June 1, 2002	B	DU will work with growers to line up equipment and supplies to insure proper/timely planting
	Subtask 1.2.3	Supply agronomic support and adapt as needed on new lands	March 1-October 31, 2002	B	DU will supply field technician to work closely with growers to insure that rice is planted and grown according to developed agronomic data
	Subtask 1.2.4	Monitor crop conditions and collect data on production requirements, costs and returns on new rice lands	April 15 – December 31, 2002	B	Field technician will work closely with growers and collect data on agronomics, costs and return of new rice lands; Adapt procedure as needed.
	Subtask 1.2.5	Hold public workshop and report year 1 findings; Develop list of additional interested growers	October 1-15, 2002	B	Workshop numbers may be increased pending grower interest and availability
	Subtask 1.2.6	Contact growers from workshop list; sign-up growers interested in the Project	October 15, 2002-December 31, 2002	C	Growers will be required to sign a three year commitment letter to grow rice
	Subtask 1.2.7	Prepare an additional 5000 acres of Delta land for rice production that meet Project goals and objectives	October 1, 2002-March 31, 2003	C	Some land leveling and preparation may take place into 2003 but will be completed before expected planting date of April-May, 2003
Year 3:	Subtask 1.3.1	Review agronomic/economic monitoring data from year 2, update data	January 1, 2003- March 31, 2003	B	Collect, analyze, report data to growers, funder and other interested parties.
	Subtask 1.3.2	Plant original 5,000 acres of land to rice, plant an additional 5,000 acres of land to rice	April 1-June 1, 2003	C	DU will work with growers to line up equipment and supplies to insure proper/timely planting

**DUCKS UNLIMITED FY 2000 CALFED PROJECT PROPOSAL – Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.**

	Subtask 1.3.3	Supply agronomic support and adapt as needed on first and second year lands	March 1-October 31, 2003	C	DU will supply field technician to work closely with growers to insure that rice is planted and grown according to developed agronomic data.
	Subtask 1.3.4	Monitor crop conditions and collect data on production requirements, costs and returns	April 15 – December 31, 2003	C	Field technician will work closely with growers and collect data on agronomics, costs and return of new rice lands; Adapt procedure as needed.
	Subtask 1.3.5	Prepare a draft and final report on feasibility of growing rice in the delta including agronomic principles, costs and expected returns	January 1 – December 31, 2004	C	Report will include a full discussion of the feasibility of growing rice in the Delta including agronomics and economic issues Deliverable: One final report and ten copies including final reports on wildlife benefits, subsidence and water quality.
Delta Rice Project	Task 2.0	Assessment of Impact to Water Birds	April 1, 2001-March 31, 2004		
Year 1	Subtask 2.1.1	Collect samples from 10 rice and 10 cornfields to determine food availability in corn and rice fields.	September 1, 2001-March 1, 2002	D	Data will be collected on rice currently in production.
	Subtask 2.1.2	Analyze samples from first year.	November 1, 2001-August 1, 2002	D	Data will be used to determine sampling method for following year.
	Subtask 2.1.3	Prepare report on results of first year.	November 1, 2002-December 31, 2002	D	We will prepare a report on the first years analysis and make it available to all interested parties.
Year 2	Subtask 2.2.1	Collect samples from 10 rice and 10 corn fields to determine food availability in corn and rice fields.	September 1, 2002-March 1, 2003	B	
	Subtask 2.2.2	Analyze samples from year 2.	November 1, 2002-August 1, 2003	B	Again, we will determine if current methods are adequate to meet objectives and make needed modifications.
	Subtask 2.2.3	Prepare report on results of first two years.	November 1, 2003-December 31, 2003	B	We will prepare a report on the first and second years analysis and make it available to all interested parties.
Year 3	Subtask 2.3.1	Collect samples from 10 rice and 10 corn fields to determine food availability in corn and rice fields.	September 1, 2003-March 1, 2004	B	
	Subtask 2.3.2	Analyze samples from year 3.	November 1, 2003-August 1, 2004	B	
	Subtask 2.3.3	Prepare final report.	November 1, 2004-December 31, 2004	B	We will prepare a final report on and make it available to all interested parties.
Delta Rice Project	Task 3.0	Water Quality Monitoring and Evaluation	April 1, 2001-March 31, 2004		Discharge water quality will be monitored on winter-flooded rice and corn fields for comparison.

**DUCKS UNLIMITED FY 2000 CALFED PROJECT PROPOSAL – Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.**

Yeas 1	Subtask 3.1.1	Monitor discharge water quality on existing winter-flooded corn and rice fields.	May 1, 2001–March 31, 2002	E	Water quality will be monitored on pilot rice project and existing corn fields.
	Subtask 3.1.2	Evaluate and analyze data collected.	March 31, 2002–May 1, 2002	E	Data will be analyzed from pilot rice project and existing corn fields.
	Subtask 3.1.3	Update monitoring protocol as needed.	March 31, 2002–May 1, 2002	E	Protocol will be evaluated and updated as needed to provide robust data.
Yeas 2	Subtask 3.2.1	Monitor discharge water quality on existing corn and rice fields, and monitor new rice fields.	May 1, 2002–March 31, 2003	B	Additional 5,000 acres of rice will be monitored for water quality along with existing pilot rice project and existing corn fields.
	Subtask 3.2.2	Evaluate and analyze data collected.	March 31, 2003–May 1, 2003	B	Data from both first and second year will be analyzed and evaluated.
	Subtask 3.2.3	Update monitoring protocol as needed.	March 31, 2003–May 1, 2003	B	Protocol will be evaluated and updated as needed to provide robust data.
Yeas 3	Subtask 3.3.1	Monitor discharge water quality on existing corn and rice fields, and monitor new rice fields.	May 1, 2003–March 31, 2004	C	Additional 5,000 acres of rice will be monitored for water quality along with existing pilot rice project and existing corn fields.
	Subtask 3.3.2	Evaluate and analyze data collected.	March 31, 2004–May 1, 2004	C	Data from all three years will be analyzed and evaluated.
	Subtask 3.3.3	Prepare draft and final analysis reports.	March 31, 2004–May 1, 2004	C	A report on water quality will be prepared and included in the final report.
Delta Rice Project	Task 4.0	Monitor and Evaluate Subsidence	April 1, 2001–March 31, 2002		Subsidence will be monitored on winter-flooded rice and corn fields for comparison.
Year 1	Subtask 4.1.1	Monitor subsidence on existing winter-flooded corn and rice fields.	May 1, 2001–March 31, 2002	F	Subsidence will be monitored on pilot rice project and existing corn fields.
	Subtask 4.1.2	Evaluate and analyze data collected.	March 31, 2002–May 1, 2002	F	Data will be analyzed from pilot rice project and existing corn fields.
	Subtask 4.1.3	Update monitoring protocol as needed.	March 31, 2002–May 1, 2002	F	Protocol will be evaluated and updated as needed to provide robust data.
Year 2	Subtask 4.2.1	Monitor subsidence on existing winter-flooded corn and rice, and new rice fields.	May 1, 2002–March 31, 2003	B	Additional 5,000 acres of rice will be monitored for subsidence along with existing pilot rice project and existing corn fields.
	Subtask 4.2.2	Evaluate and analyze data collected.	March 31, 2003–May 1, 2003	B	Data from both first and second year will be analyzed and evaluated.
	Subtask 4.2.3	Update monitoring protocol as needed.	March 31, 2003–May 1, 2003	B	Protocol will be evaluated and updated as needed to provide robust data.
Year 3	Subtask 4.3.1	Monitor subsidence on existing winter-flooded corn and rice, and new rice fields.	May 1, 2003–March 31, 2004		Additional 5,000 acres of rice will be monitored for subsidence along with existing pilot rice project and existing corn fields.

**DUCKS UNLIMITED FY 2000 CALFED PROJECT PROPOSAL – Rice in the Delta: A pilot project to convert 10,000 acres of legal delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality.**

	Subtask 4.3.2	Evaluate and analyze data collected.	March 31, 2004-May 1, 2004	C	Data from all three years will be analyzed and evaluated.
	Subtask 4.3.3	Prepare draft and final analysis reports.	March 31, 2004-May 1, 2004	C	A report on subsidence will be prepared and included in the <b>final</b> report.
Delta Rice Project	Task 5.0	Project Management: Manage overall program, develop contracts/forms, oversee field staff activities, compile and report findings, invoice funders	April 1, 2001 – March 31, 2004	All	Cost of project management commensurate with project accepted for funding

**DUCKS UNLIMITED FY 2000 CALFED PROJECT PROPOSAL - Rice in the Delta: A pilot projec to covert 10,000 acres of legal Delta lands to rice production and study the effects of rice culture on wildlife benefits, subsidence and water quality**

Table 1. Delta Rice annual and total budget											
Year	Task	Direct Labor Hours	Salary Including FICA	Benefits @ 20% of Salary	Subject to Overhead				Exempt from Overhead		Total Cost
					Travel	Staff Support & Supplies	Service Contracts	Overhead (13.55%)	Equip-ment	Graduate Student Fee Remission	
Year 1	Task 1: Rice Conversion	1500	\$36,000	\$7,200	\$9,750	\$27,000	\$1,250,000	180,208	\$8,000		\$1,518,158
	Task 2: Waterbird Assessment	833	\$20,000	\$4,000	\$5,500	\$14,994	\$116,020	21,750	\$18,700	\$20,000	\$220,964
	Task 3: Monitor Water Quality	340	\$8,160	\$1,632	\$1,500	\$6,120	\$15,600	4,473	\$1,500		\$38,985
	Task 4: Monitor Subsidence	340	\$8,160	\$1,632	\$1,500	\$6,120	\$581,250	81,119	\$227,000		\$906,781
	Project Management	900	\$30,200	\$6,040	\$1,000	\$16,200		7,241			\$60,681
Total Cost Year 1			\$102,520	\$20,504	\$19,250	\$70,434	\$1,962,870	294,791	\$255,200	\$20,000	\$2,745,569
Year 2	Task 1: Rice Conversion	1500	\$36,000	\$7,200	\$9,750	\$27,000	\$1,500,000	214,083	\$1,000		\$1,795,033
	Task 2: Waterbird Assessment	833	\$20,000	\$4,000	\$7,000	\$14,994	\$116,020	21,953	\$4,000	\$21,000	\$208,967
	Task 3: Monitor Water Quality	340	\$8,160	\$1,632	\$1,500	\$6,120	\$26,000	5,882	\$0		\$49,294
	Task 4: Monitor Subsidence	340	\$8,160	\$1,632	\$1,500	\$6,120	\$200,936	29,586	\$0		\$247,934
	Project Management	900	\$30,200	\$6,040		\$16,200		7,106			\$59,546
Total Cost Year 2			\$102,520	\$20,504	\$19,750	\$70,434	\$1,842,956	278,610	\$5,000	\$21,000	\$2,360,774
Year 3	Task 1: Rice Conversion	1500	\$36,000	\$7,200	\$9,750	\$27,000	\$500,000	78,583	\$1,000		\$659,533
	Task 2: Waterbird Assessment	833	\$20,000	\$4,000	\$7,000	\$14,994	\$112,420	21,465	\$4,000	\$22,000	\$205,879
	Task 3: Monitor Water Quality	340	\$7,480	\$1,496	\$1,500	\$6,120	\$26,000	5,772	\$0		\$48,368
	Task 4: Monitor Subsidence	340	\$7,480	\$1,496	\$1,500	\$6,120	\$211,228	30,870	\$0		\$258,694
	Project Management	900	\$30,200	\$6,040	\$1,000	\$16,200		7,241			\$60,681
Total Cost Year 3			\$101,160	\$20,232	\$20,750	\$70,434	\$849,648	143,931	\$5,000	\$22,000	\$1,233,155
Total Project Cost			\$306,200	\$61,240	\$59,750	\$211,302	\$4,655,474	717,332	\$265,200	\$63,000	\$6,339,498

## STATEMENT OF QUALIFICATIONS

Ducks Unlimited, Inc. Staff:

**Olen C. Zirkle, Jr.** Mr. Zirkle brings a diverse background to Ducks Unlimited. Educated at U.C. Davis, earning a Bachelor of Science degree in Ag-Production/Agronomy, he has spent a lengthy career working with agriculture on operational and management issues. Mr. Zirkle is currently employed by Ducks Unlimited as an Agricultural Lands and Water Specialist where he manages both the Lower Butte Creek Project and the Sutter Basin Agricultural Easement Project. He recently completed a three and one-half year contract with The Nature Conservancy where he managed their Ricelands Habitat Project and initiated and implemented Phase I of the Lower Butte Creek Project. Mr. Zirkle may be reached at the Western Regional Office at 3074 Gold Canal Drive, Rancho Cordova CA 95670-6116; Ph:(916) 852-2000; Fax:(916) 852-2200; e-mail: [ozirkle@ducks.org](mailto:ozirkle@ducks.org).

Relevant Experience

Mr. Zirkle has spent his entire career working in agriculture in managerial and technical positions. Educated as an agronomist, he worked for 16 years with Spreckels Sugar Company as a field superintendent and agricultural property manager. Subsequently, he managed grain marketing and storage cooperative comprised of 800 farmer members in Southeastern Arizona. In one of his most recent activities, he managed and marketed the foreclosed properties for the western office of the Federal Land Bank. Mr. Zirkle is a licensed real estate broker, and has extensive training and expertise in agricultural property appraisal. Since 1995, Mr. Zirkle has worked extensively on fish passage issues. He currently manages the Lower Butte Creek Project which is a landowner driven process that brings farmers, wetland managers and resource agencies together to resolve fish passage issues along Butte Creek, a native spring-run chinook salmon spawning stream.

Project Responsibility

Mr. Zirkle's title is Agricultural Lands and Water Specialist. His role in this project is to manage all stakeholder related actions, Mr. Zirkle will also work with the consultants and Ducks Unlimited staff on public outreach issues.

**Mike Eichholz** Mr. Eichholz's title is an Evaluation and Monitoring Coordinator/Central Valley Habitat Joint Venture. He has obtained a B.S. in 1990 at Southern Illinois University Carbonadale, a M.S. in 1996 at the University of Alaska Fairbanks. and is expecting to complete his Ph.D. in Spring 2000, Univeristy of Alaska Fairbanks.

Relevant Experience

Mr. Eichholz's current responsibilities are to coordinate and conduct research that will maximize the efficiency of wetland and upland habitat development in the Central Valley of California and to develop a long term Evaluation and Monitoring Plan for the Central Valley Habitat Joint Venture. He is currently involved in studies addressing waterfowl food availability and depletion rate in the rice fields and moist soil habitats of the Central Valley and Suisun Marsh in California, determining limiting factors of mallard duck populations breeding and wintering in California, and identifying and quantifying environmental factors that influence waterfowl habitat availability in the Central Valley.

Project Responsibilities

Mr. Eichholz's role and responsibility for this project is Manager to the waterbird monitoring project, analysis, and reporting.

**Peter E. Schmidt** Mr. Schmidt oversees project development for Duck Unlimited's Valley/Bay CARE program in the Sacramento Valley, Suisun Marsh, and the Sacramento/San Joaquin delta and has a Master's degree in natural resources/wildlife management, Humboldt State University, 1999, and a Bachelor of Science degree in wildlife management, Humboldt State University, 1995. He administers programs with budgets in excess of \$1 million. He is responsible for coordinating the engineering and design, project delivery and inspection, and budget tracking for all private land projects within this area. In addition, Mr. Schmidt works extensively with many different agencies and groups on cooperative wetland restoration and enhancement projects. He works also with the agricultural community to enhance properties for wildlife benefits. Prior to

## ATTACHMENT E

joining Ducks Unlimited Mr. Schmidt worked for the California Department of Fish and Game in the Humboldt Bay area. He **was** responsible for restoration and maintenance on four state wildlife areas. Mr. Schmidt also served as a volunteer caretaker for the U. S. Fish and Wildlife Service at the Humboldt Bay.

### Relevant Experience

Mr. Schmidt currently administers several large-scale projects including a North American Wetlands Conservation Act (NAWCA) grant, an agricultural winter flooding program under the Central Valley Project Improvement Act (CVPIA), and a waterfowl production program in the Suisun Marsh. These programs involve budgets in excess of \$1 million each and require oversight and coordination among several state and federal agencies, non-profit organizations, and private landowners and foundations.

### Project Responsibility

Mr. Schmidt will be responsible for oversight and administration of subsidence and water quality monitoring as well as general biological program advisor.

**Peter Bontadelli** Mr. Bontadelli brings a strong environmental policy and technical compliance background to assist in Ducks Unlimited, Inc. projects. Mr. Bontadelli holds a Bachelor of Science degree in Political Science from U.C. Davis. Mr. Bontadelli consults for PFB & Associates which he formed in 1991 and serves as President. He currently consults for Ducks Unlimited, Inc. on a variety of projects. Mr. Bontadelli may be reached at PFB & Associates, 4141 Palm #581, Sacramento, CA 95842; Phone: (916) 332-6354; Fax: (916) 332-6354; e-mail: [bontadelli@mailcity.com](mailto:bontadelli@mailcity.com)

### Relevant Experience

National Academy of Science - 3 publications, OPA 90 (Oil Pollution Act 1990 - amendment to Clean Water Act), Tanker Design, Mitigation Issues, Salvage Posture, State of California: Administrator Office of Spill Prevention & Response 1992-1999, Director of Fish & Game 1987-1991, Chief Deputy Director Fish & Game 1985-1987, Special Assistant to Director of Fish & Game 1985-1985, International Association of Fish & Wildlife Agencies, Water Committee, Chair 1985-1992, Pacific Fisheries Management Council, State of California Council Seat 1987-1991, U.S. Coast Guard, Member of the Coast Guard Regulation Negotiation Committee 1992, U.S. Fish & Wildlife Service, Pacific Flyway Council, Chairman 1987 - 1991, Advisory to USFWS in setting national migratory bird hunting regulations. U.S. Dept. of Interior, National American Wetlands Council, Charter Member 1989 - 1991, Responsible for setting policy and oversee implementation of the North American Wetlands Act.

**Jav Dee Garr** Mr. Garr is a Regional Agricultural Specialist: Interface of the wetland/wildlife programs with agriculture, especially implementation of the agricultural enhancement objectives of the VALLEY/BAY CARE Program in the rice growing areas of the Sacramento Valley. He has obtained a B.S. in Agriculture with a Minor in Biology, General Secondary Teaching Credential - Life.

### Relevant Experience

Mr. Garr has extensive knowledge of agricultural land management and farming practices, including methods to improve wildlife benefits on private land that are compatible with agriculture, extensive knowledge of federal and state laws and regulations regarding agricultural land use and environmental issues and knowledge of both theoretical and applied principles of wildlife biology and wetland community ecology and their interrelationship with agriculture. 1990 - 1993, Owner/Operator, J.D. Garr Ranch (rice), Colusa, CA; 1990-1993, Owner/Operator, Contract Rice Water Management.

### Project Responsibility

Work Rice agronomics, assist the Project Agricultural Specialist, and give technical assistance to Delta landowners.

## Waterbird Usage Hypotheses

This represent a more detailed discussion for each objective listed in category IV. Waterbird Usage in the Project Description. This discusses the comparison of quantity and type of water bird use between the two crop types.

### Objectives:

(1) To determine the difference in the quantity of waste grain upon waterfowl arrival in the fall between the two crop types we will test the null hypothesis:

**H<sub>0</sub>1:** Mass of waste grain per acre does not differ between **corn** and rice fields before waterfowl arrival.

Data from soil plugs as well as the ear and grain plots will be used to test this hypothesis the first year. Results from the first year will then dictate whether which sampling methods are used to address this hypothesis thereafter.

(2) The second objective will be tested with the null hypotheses:

**H<sub>0</sub>2:** The food depletion rate does not differ between corn and rice fields.

**H<sub>0</sub>3:** The abandoning threshold does not differ between corn and rice fields.

The depletion rate should take the form of the negative exponential function  $y = k + x^{-z}$ , where  $y$  = grain density,  $k$  = a constant = the minimum feeding threshold, and  $x^{-z}$  = the slope of the depletion rate. We will conduct a similar analysis using all food types (grain, moist soil plant seeds, and invertebrates) as the dependent variable  $y$ . To test the hypothesis that the depletion rate does not differ between the two field types we will calculate  $x$  for each field, then use  $x$  as the dependent variable in an ANOVA with field type as the independent variable. However, other factors such as hunting pressure, water depth, and distance from sanctuary, will likely affect the depletion rates. Therefore, we will also use **ANCOVA** to test for a difference in  $x$  between the two field types using these other variables as covariates. To test the hypothesis that abandoning thresholds differ, we will conduct a similar analysis as described above using  $k$  as the dependent variable.

(3) To address the third objective we will test the null hypothesis:

**H<sub>0</sub>4:** The proportion of grain consumed by waterfowl does not differ between the two field types.

We will test this hypothesis by dividing the amount of grain left in the fields after birds reach the abandoning threshold by the amount of grain in the field before waterfowl arrival. This proportion will then be tested for a significant difference between the two field types using ANOVA.

(4) and (5) We will address the fourth and fifth objectives by testing the null hypotheses:

**H<sub>0</sub>5:** Invertebrate production does not vary between the two field types.

**H<sub>0</sub>6:** Moist soil plant seed production does not vary between the two field types.

We will estimate benthic invertebrates and moist soil plant seeds with soil plugs from each of the 10, 5 corn and 5 rice, exclosed intensive study field plots. Plugs will be frozen within 24 hours of collection and

sorted for invertebrates and moist soil seeds later. Because more mobile invertebrates in the water column are often under represented in soil plugs, will supplement the estimates of invertebrates with traps placed in each exclosure. These samples will be stored in 95 % ethanol and quantified later. All moist soil plant seeds will be quantified and sorted to genus and invertebrates will be quantified and identified to order.

(6) To determine and compare the relative amount of energy lost during decomposition between corn and rice we will test the null hypothesis:

**H<sub>0</sub>7: Decomposition rate of corn and rice grains do not significantly differ.**

To obtain "time zero" nutrient analyses, random control samples for each grain type will be removed from each of the 10 intensive study fields, dried to a constant weight at 60°C and ground in a 1mm-mesh Wiley Mill, and analyzed for energy content. Samples of waist grain will then be collected from the open plots in the intensive study fields if grain is available, if not the samples will be taken from the exclosed plots every 6 weeks. Samples will be returned to the lab immediately following retrieval. Samples will be washed lightly to remove soil and debris, and then will be oven-dried at 60°C until constant weight is reached. Each sample will then be weighed to the nearest  $\pm 0.01$  g and gross energy determined by oxygen bomb calorimeter.

(7) and (8) We will address objectives seven and eight with the null hypotheses:

**H<sub>0</sub>8: There is no significant difference in the rate of energy acquisition between corn and rice fields.**

**H<sub>0</sub>9: There is no significant difference in the total amount of energy acquired between corn and rice fields.**

The hypotheses will be tested using the information gathered to address the first six objectives. We will compare the difference in the amount of food (grain, moist soil plant seeds, and invertebrates) available between open and exclosed plots from the 10 intensive study fields and attribute the difference between the paired plots to water bird consumption. We will use published estimates to determine metabolizability of the food types for the analysis.

(9) To address objective nine we will test the null hypothesis:

**H<sub>0</sub>10: There is no difference quantity of water bird use between corn and rice fields.**

Use by waterbirds may differ between flooded rice and corn independent of food availability. Therefore, we will census waterbirds at the 10 intensive study fields every 3 days and the 10 food availability fields every 7 days following Elphick (1998). We will monitor water bird use both during daylight and after dark, because most feeding by waterfowl in California occurs after dark (Fleskes 1999). When monitoring waterbird use, water depth and distance from disturbance will be recorded, because these factors have been determined to be important in previous studies (Elphick 1998). We will also test for differences between waterfowl and other waterbirds because different factors likely drive use patterns between these two groups.

(10) To address the final objective we will test the hypothesis:

**H<sub>0</sub>11: Proportion of time: feeding, alert, and resting does not differ between the two crop types.**

Because we will be studying an unmarked sample of birds, behavioral data will be collected by scan sampling all birds in at the study site, every 10 minutes, for two-hour periods. Four hours of data will be collected every 3 days on the intensive study fields and 7 days on the food availability fields during daylight hours. Two hours of data will be collected every 3 days on the intensive study fields every 7 days on the food availability fields after dark. Data will be separated into day and night samples, and between waterfowl and other waterbirds.